

1.0 PURPOSE AND NEED

Telegraph Street starts at the I-15 Interchange at milepost (MP) 10 (Green Springs Drive Interchange) and extends to State Route 9, the main route from I-15 to Hurricane, Utah. It is the primary east-west route through Washington City. The section of Telegraph Street that extends from Green Springs Drive to 300 East is also known as State Route 212 (SR 212).

The land use along the street varies. From the Green Springs Drive Interchange to Mill Creek, the land use adjacent to Telegraph Street is newly developed commercial. From Mill Creek to 300 East, the corridor runs adjacent to parks and historic buildings (residential and commercial).

Except for a portion from 500 West (MP 0.55) to 300 East (MP 1.29), Telegraph Street is a five-lane roadway consisting of four travel lanes and a median. Between 500 West and 300 East, it is a three-lane roadway, consisting of two travel lanes with a center turn lane and reducing to two lanes on the bridge over Mill Creek. It is this $\frac{3}{4}$ -mile section of roadway that comprises the proposed project area (see **Figure 1.1**).

Designated by the 2005 Washington City General Plan (the General Plan) as Historic Downtown, the section between 500 West and 300 East of Telegraph Street is inadequately sized to handle current and projected traffic volumes. This narrow section creates a bottleneck for traffic traveling through the corridor, and access from side streets is difficult and unsafe. The problems created by this bottleneck will only get worse as Washington City continues to grow.

Washington City's population doubled between 1990 and 2000, representing an annual growth rate of 6.9 percent. The city estimates the 2005 population to be approximately 15,000, representing a 13 percent annual growth rate since 2000. According to the General Plan, by 2020, Washington City's population is projected to be over 36,000. By 2030, it is estimated that most intersection movements throughout the corridor will reach a Level of Service (LOS) F, consistent with Highway Capacity Manual (*HCM*, 2000) LOS definitions.

1.1 Proposed Action

Improvements to this corridor are proposed to accommodate existing and projected traffic. The proposed improvements include widening to a five-lane section with four travel lanes and a median to match the rest of the corridor and replacing the Mill Creek Bridge to accommodate the same typical section. Sidewalks and parkstrips will also be provided for pedestrians. Other opportunities for corridor beautification, in addition to parkstrips, have been identified by Washington City; such measures will be accommodated to the extent practicable in the proposed project.



Historic Downtown

Figure 1.1 Study Area Map

1.2 History of the Project

In March of 2005, a Concept Report was completed for the section of Telegraph Street between 500 West and 300 East in Washington City. The Concept Report accomplished the following:

- Assessed existing conditions along the project corridor
- Conducted a preliminary environmental review
- Identified key environmental and community issues that would need to be considered as a project was developed
- Presented preliminary objectives
- Studied three alternatives to address project objectives
- Developed cost estimates for those alternatives
- Identified and recommended the level of environmental documentation a project would require
- Developed a draft public involvement plan to be used in the development of a project

Based on these accomplishments, a comprehensive Environmental Assessment (EA) is being undertaken to solidify a Purpose and Need and to examine the broader issues associated with transportation needs within the study area.

1.3 Purpose of the Proposed Action

The purpose of this project is to address the needs identified in Section 1.4, as summarized below.

1.3.1 Replace the Mill Creek Bridge

- Bring the Mill Creek crossing up to the latest standards to eliminate the existing bridge's deficiencies.

1.3.2 Improve Safety

- Identify and mitigate factors contributing to the higher than expected accident rate
- Address substandard curb radii to accommodate turning vehicles
- Incorporate sidewalk/ramp improvements for Americans with Disabilities Act (ADA)-compliant pedestrian access
- Apply access management principles to improve access to and from Telegraph Street

1.3.3 Relieve Traffic Congestion, Increase Capacity

- Provide connectivity and reduce traffic congestion to a minimum LOS D or better on Telegraph Street and at all corridor intersections
- Provide signals at locations warranting signalization while preserving traffic flows at the minimum acceptable LOS D
- Apply access management principles to increase the ability to move traffic through the corridor

1.3.4 Improve Roadway Access

- Design the roadway to meet current UDOT, AASHTO, and Washington City standards for access management.
- Design approach widths for residential and commercial driveways to meet standards.
- Design the roadway to provide required spacing between driveways where needed and where it is feasible to do so.

1.3.5 Enhance the Community

- Preserve the historic nature of downtown Washington City to the extent possible
- Preserve the existing recreational facilities in the general area

1.3.6 Correct Roadway Deficiencies

- Design the shoulder width to be consistent throughout the project corridor and to meet current UDOT and AASHTO standards.
- Improve the stopping sight distance at the 500 West intersection.
- Improve the intersection sight distance at the intersections of 500 West and 100 West on Telegraph Street.
- Design the intersections at 300 East, Main Street, and 500 West to accommodate large trucks making right hand turns.
- Design sidewalks and other pedestrian accommodations to meet current UDOT, AASHTO and Washington City standards.
- Remove obstacles within the roadway clear zone where appropriate.

1.3.7 Improve Roadway Continuity

- Create roadway continuity and decrease the traffic bottleneck by designing the roadway to match the typical sections to the east and west of the project area.

1.4 Need for the Proposed Action

Outside the proposed project limits (500 West to 300 East), Telegraph Street has roadway sections built-out to accommodate future traffic volumes; as such, this provides logical termini for the proposed project. To satisfy current and expected functional needs for this segment of Telegraph Street and to meet future needs determined by Utah Department of Transportation (UDOT) traffic projections, a facility that can convey projected traffic volumes of 29,000 vehicles per day is required (vpd).

The next several sections discuss the concerns within the project study area; deficiencies, safety, capacity, and others, which would be addressed by the proposed action alternatives.

1.4.1 Mill Creek Bridge Deficiencies (D-416)

Washington City's Transportation Master Plan (TMP), adopted in December 2005, accurately identified the status of the Mill Creek Bridge as "functionally obsolete." Its 30-foot roadway width allows for two travel lanes and is the narrowest segment of Telegraph Street, contributing to traffic congestion under existing conditions.

Built in 1937, the Mill Creek Bridge does not meet current American Association of State Highway and Transportation Officials (AASHTO) loading or width requirements. No substantive modifications have been made since its construction. In addition, the bridge has a low structural sufficiency rating (59.9 out of 100 points, made in January 28, 2003 through the UDOT Bridge Inspection Program), indicating that the bridge needs to be upgraded. Though the structure as a whole meets minimum standards of age and integrity for inclusion in the National Register of Historic Places (NRHP), many features which exhibit Art Modern characteristics – including approaches, parapets, and sidewalks – are structurally and functionally substandard.

In summary, the bridge deficiencies include:

- Substandard structural capacity – The bridge does not meet current AASHTO loading requirements (designed to AASHTO HS-15 rather than HS-20-44).
- Substandard bridge rail, rail transition, approach rail and approach ends – The rail, rail transition, approach rail and ends do not meet current crash attenuation requirements.
- Substandard sidewalk widths (5 feet) – The sidewalks do not meet current minimum width standards (6 feet). In addition, they are not separated from the traffic in accordance with current standards.

1.4.2 Safety

The most recent accident data (2000-2005) was analyzed for Telegraph Street between 500 West and 300 East. The accident rate for the corridor is 4.11 with an expected accident rate of 2.65. The severity rate is 1.47 with an expected severity rate of 1.61.

The accident rate is higher than expected, while the severity rate is lower than expected. This is due to a high number of property-damage-only accidents within the corridor.

The majority of accidents occurred in three locations, the intersections of 300 West (36 percent), 300 East (12 percent), and 500 West (10 percent).

At the 300 West intersection, the majority of accidents are rear-end collisions (78 percent). Recent improvements (2005) have been made to this intersection to reduce the number of accidents. Eastbound left-turns on Telegraph Street have been prohibited, and a median island has been installed on 300 West to allow right-turns only. These improvements were made because left-turning traffic would block the through-traffic lanes, causing the majority of rear-end accidents within the study area. These improvements would help make the accident rate for the proposed project area more comparable with the expected accident rate.

The 300 East intersection is the only signalized intersection within the study area, and the majority of the accidents there are right-angle collisions (64 percent). Right-angle accidents are collisions between vehicles turning left and opposing vehicles continuing through an intersection. The left-turning traffic is increasing as development occurs to the south, which is contributing to the number of right-angle accidents.

The majority of the accidents at the 500 West intersection are rear-end and right-angle accidents (44 percent each). A signal warrant study was completed in 2003 with no warrants being met. However, a peak hour traffic count conducted on June 16, 2004 shows that Signal Warrant 3 has been met. Signal Warrant 3 is defined in the U.S. Department of Transportation's 2003 Edition of the Manual on Uniform Traffic Control Devices (MUTCD) as such:

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

With the development that has recently been completed adjacent to the intersection and more coming in the near future, more signal warrants are likely to be met.

1.4.3 Roadway Capacity and Demand

The current traffic demand in this corridor (classified as a minor arterial) is higher than the roadway capacity. The estimated maximum daily capacity for a three-lane facility is 15,000 vehicles per day (vpd). The 2005 Average Annual Daily Traffic (ADT) for Telegraph Street recorded by UDOT is 18,000 vpd.

1.4.3.1 Current Capacity

Afternoon peak hour traffic volumes were collected in June 2004. These counts were adjusted to represent 2006 traffic volumes. A LOS analysis was then performed on the projected 2006 traffic based on methodologies found in the Transportation Research Board's HCM. **Table 1.1** shows the average vehicle delay and LOS at the signalized intersections, and **Table 1.2** shows the average vehicle delay and LOS at unsignalized intersections. As seen, many movements at the unsignalized intersections are failing at the present time.

Table 1.1 - Signalized Intersection – 2006 Delay and LOS

		Main Street		300 East	
Traffic Movement		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
EB	Left	6.6	A	13.6	B
EB	Through	14.9	B	12.4	B
EB	Right				
EB Approach		14.3	B	12.6	B
WB	Left	4.8	A	21.4	C
WB	Through	7.6	A	18.1	B
WB	Right				
WB Approach		7.6	A	18.5	B
NB	Left	17.5	B	8.5	A
NB	Through	17.4	B	6.2	A
NB	Right				
NB Approach		17.4	B	7.9	A
SB	Left	18.1	B	6.0	A
SB	Through	17.4	B	6.4	A
SB	Right				
SB Approach		17.7	B	6.4	A
Intersection		11.8	B	12.6	B

sec/veh = Seconds per vehicle

LOS = Level of Service

EB = Eastbound

WB = Westbound

NB = Northbound

SB = Southbound

Table 1.2 - Unsignalized Intersection – 2006 Delay and LOS

Intersection		500 West		300 West		200 West		100 West	
Traffic Movement		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
EB	Left	9.4	A	Prohibited		11.6	B	10.8	B
WB	Left	10.8	B			10.2	B	10.2	B
NB	Left	300.5	F			697.5	F	310.1	F
NB	Through	24.1	C			74.7	F	35.8	E
NB	Right								
NB Approach		88.9	F			341.6	F	106.1	F
SB	Left	245.2	F			>1000	F	496.6	F
SB	Through	20.0	C	15.3	C	23.9	C	40.7	E
SB	Right								
SB Approach		62.5	F	15.3	C	>1000	F	230.7	F
Intersection		100 East		Neilson Dr.		200 East			
Traffic Movement		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS		
EB	Left	9.7	A			9.9	A		
WB	Left	13.5	B	13.3	B	11.8	B		
NB	Left	277.8	F	29.8	D	79.0	F		
NB	Through	37.2	E			37.2	E		
NB	Right								
NB Approach		107.8	F	29.8	D	59.1	F		
SB	Left	177.8	F			120.5	F		
SB	Through	17.7	C			16.3	C		
SB	Right								
SB Approach		23.8	C			74.8	F		

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Historical data from UDOT show that the ADT for Telegraph Street has increased by an average of 2.6 percent annually since 1985 and is anticipated to continue to grow at a similar rate. With this level of growth, additional failures will occur. Failures at 500 West will occur first. The 500 West intersection supports traffic accessing the adjacent Wal-Mart, enough traffic that the peak hour traffic signal warrant has recently been met at this location. Generally, the northbound/southbound movements at all unsignalized intersections are experiencing LOS C or below due to the increase in through traffic.

Additionally, it is difficult for side-street traffic at these two-way stop controlled intersections to access Telegraph Street during peak traffic intervals.

1.4.3.2 Future Demand

Traffic projections provided by UDOT are the basis for the determining future volumes used in this study. The information from UDOT projected the year 2030 to have an ADT of approximately 29,000. Based on the information provided by UDOT, future traffic volumes by movement were determined based on projecting the existing traffic data by 2.6 percent each year.

Using an ADT of 29,000 vpd, an LOS analysis was performed for the corridor assuming no improvements will be made. **Table 1.3** shows the average vehicle delay and LOS at the signalized intersections assuming the 500 East and Main Street intersection will be signalized. **Table 1.4** shows the average vehicle delay and LOS at unsignalized intersections. By 2030, several intersections will reach a LOS F if no improvements are made.

Table 1.3 - Signalized Intersection – 2030 Delay and LOS

Intersection		500 East		Main Street		300 West	
Traffic Movement		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
EB	Left	34.9	C	82.2	F	132.4	F
EB	Through	84.8	F	60.0	E	38.2	D
EB	Right	2.1	A				
EB Approach		78.1	E	61.5	E	53.5	D
WB	Left	512.2	F	29.8	C	491.5	F
WB	Through	14.7	B	16.3	B	27.1	C
WB	Right						
WB Approach		51.4	D	16.6	B	85.3	F
NB	Left	71.7	E	59.0	E	56.2	E
NB	Through	100.0	F	54.8	D	18.3	B
NB	Right						
NB Approach		93.4	F	56.1	E	46.2	D
SB	Left	72.8	E	70.2	E	17.4	B
SB	Through	54.6	D	54.8	D	19.9	B
SB	Right						
SB Approach		57.9	E	61.8	E	19.6	B
Intersection		68.4	E	43.1	D	56.6	E

sec/veh = Seconds per vehicle

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SB = Southbound

Table 1.4 - Unsignalized Intersection – 2030 Delay and LOS

Intersection		300 West		200 West		100 West	
Traffic Movement		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
EB	Left	Prohibited		>1000	F	>1000	F
WB	Left			16.5	C	16.3	C
NB	Left			>1000	F	>1000	F
NB	Through			>1000	F	>1000	F
NB	Right						
NB Approach				>1000	F	>1000	F
SB	Left	Prohibited		>1000	F	>1000	F
SB	Through			>1000	F	>1000	F
SB	Right	54.8	F				
SB Approach		54.8	F	>1000	F	>1000	F
Intersection		100 East		Neilson Dr.		200 East	
Traffic Movement		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
EB	Left	20.5	C			20.7	C
WB	Left	>1000	F	>1000	F	>1000	F
NB	Left	>1000	F	>1000	F	>1000	F
NB	Through	>1000	F			>1000	F
NB	Right						
NB Approach		>1000	F	>1000	F	>1000	F
SB	Left	>1000	F			>1000	F
SB	Through	>1000	F			>1000	F
SB	Right						
SB Approach		>1000	F			>1000	F

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1.4.4 Access Management

Continued mobility through this segment of Telegraph Street will require access management strategies. Eastbound/westbound traffic is experiencing slowing from vehicles exiting and entering from the various access points.

As a general application of access management throughout the corridor, the proposed project should meet UDOT standards for a Category 7 road (community rural) as outlined in UDOT's Control and Protection of State Highway Rights of Way. To meet these standards, the following guidelines should be followed: 1,320-foot signal spacing, 300-foot street spacing, and 150-foot access spacing. Because Washington City desires to take ownership of this road after the proposed project is complete, it is recommended that city standards also be followed in the design of new accesses. In this instance, the current UDOT requirements for this road are less stringent than those of the city. Furthermore, all accesses should meet AASHTO geometric guidelines.

In December 2005, Washington City approved an Access Management Plan. This plan defines Telegraph Street through the study area as an Access Category 3 (Arterial with posted speed ≤ 45 mph). The following is a list of the requirements outlined in the Access Management Plan accompanied by any associated deficiencies noted during the study:

- Minimum signalized intersection spacing of 1,320 feet – Currently all signals, including the Main Street Signal, meet this minimum spacing requirement.
- Minimum public street unsignalized spacing of 650 feet – Existing spacing between all public streets, excluding between 500 West and 300 West, do not meet the minimum spacing. On average, the spacing between unsignalized intersections is 375 feet.
- Minimum driveway spacing requires a traffic study to be performed; however, the State Access Management Plan states a minimum driveway spacing of 150 feet is required for Telegraph Street – Several driveways do not meet this criterion.
- Approach widths for residential driveways shall be between 12 and 27 feet; approach widths for commercial driveways shall be between 26 and 35 feet – Several driveways do not meet these criteria.

1.4.5 Community Enhancement

During the concept report phase, meetings were held with Washington City staff, including planners, the mayor, and the city council. They desire to make downtown Washington City a destination rather than a place to simply pass through. The downtown area becomes a destination as the area is enhanced through development, beautification of the streetscape, preservation of attractive historic structures, and incorporation of infrastructure that adds to the walkability of the area. Actions that provide landscaping opportunities, buffered sidewalk areas, and that preserve the historic nature of the downtown area address this need. These goals have been formalized within the General

Plan, dated March 2005. To the extent practicable, these and possible other actions have been considered during the study of the proposed action.

There is no public transit system in Washington City at the present time. Preliminary conversations with Washington City staff indicate that public transit is a long-term goal. With this in mind and in concert with Washington City, UDOT, and Federal Highway Administration (FHWA) staff, alternatives considered have been designed to accommodate public transit systems that are typically used in service areas such as that which this project addresses.

1.4.6 Roadway Deficiencies

FHWA's 12 critical design elements and other UDOT standards and AASHTO guidelines were evaluated along the corridor. The following sections discuss what items are deficient and why.

1.4.6.1 Shoulder Widths

Shoulder widths along the corridor are typically between 3½ and 5 feet from the shoulder line to the lip of the gutter, except at the approach to the 300 East intersection, at which point the shoulder tapers to zero feet where the additional through lanes are developed. No parking is allowed on the shoulders. UDOT standards require a minimum of 4-foot shoulders in locations without shoulder parking; but AASHTO guidelines require a minimum of 2 feet. If gutter is included as part of the shoulder width, Telegraph Street meets applicable UDOT standards for shoulder criteria except at the 300 East intersection and the bridge over Mill Creek.

1.4.6.2 Stopping Sight Distance

The minimum stopping sight distance guidance issued by AASHTO for flat conditions is 305 feet. Visual observations in the field and measurements taken from aerials indicated that the intersection stopping sight distance criterion is not met for traffic traveling westbound on Telegraph Street approaching the 500 West intersection. The main reason for this deficiency is that the north and south legs of the intersection are set back from the three-lane section, resulting in obstructions that block the intersection sight distance.

1.4.6.3 Intersection Sight Distance

The intersection sight distance was checked at each of the main intersecting roadways to verify compliance with current AASHTO guidance. AASHTO requires 445-feet of intersection sight distance for left-turning vehicles, the following locations were found to be deficient:

- North leg of 500 West intersection – line of sight blocked by adjacent property landscaping in the northeast quadrant of the intersection.
- South leg of 100 West intersection – line of sight potentially blocked by adjacent wrought iron fence in the southeast quadrant of the intersection.

1.4.6.4 Design Vehicle

Each of the curb radii at the intersections along Telegraph Street was checked to determine if sufficient space was provided for turning vehicles. Three intersections were checked using the WB-20 design vehicle: 300 East, Main Street, and 500 West. The WB-20 design vehicle was used because of the larger truck traffic using these intersections. The remaining intersections accommodate passenger vehicles and small trucks. The results of the analyses are as follows:

- 300 East – all left turns have sufficient space to complete the turns. No quadrants, except the northwest quadrant, have sufficient curb radii to accommodate the design vehicle on right turns. Signal poles at these corners have been struck and repetitive damage was noted.
- Main Street – all left turns have sufficient space to complete the turns. No quadrants have sufficient curb radii to accommodate the design vehicle on right turns.
- 500 West – all left turns have sufficient space to complete the turns. No quadrants have sufficient curb radii to accommodate the design vehicle on right turns.

1.4.6.5 Roadway Clear Zone

Roadway clear zone is the distance measured from the edge of the travel lane in which fixed obstacles should not be present or should be adequately protected from direct impact. AASHTO specifies that 14 to 16 feet of clear zone should be maintained for this facility. An analysis of the corridor found numerous items that fall within the clear zone, including:

- Steep slopes
- Landscaping (boulders, trees)
- Utilities (power poles and boxes, fire hydrants)
- Walls and fences

1.4.6.6 Pedestrian Accommodations

Sidewalks are located on the north and south sides of the roadway through the corridor immediately behind the curb and gutter and vary from 4 to 5 feet in width. The overall sidewalk condition is good with a few locations of significant cracking. UDOT standards state that when the sidewalk is immediately behind the curb and gutter the minimum width needs to be 6 feet, with a desirable width of 8 feet. Pedestrian access ramps are not present at numerous intersection crossings, and the few ramps in place do not meet the current ADA pedestrian access requirements.

1.4.7 Continuity of the Roadway

This section of Telegraph Street is the only section that does not have two lanes of traffic in each direction. The result is a bottleneck for traffic. In order to maintain the continuity of Telegraph Street and remove the traffic bottleneck, this section will also need to be widened to two lanes of traffic in each direction.